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are of the same type as the living ones and it appears that some of the *Mycetophylidæ* have continued through the long lapse of time without evolutionary progress except for the changes in minor specific characters.

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NOTES ON BIOLOGICAL METHODS FROM UNIVERSITY OF ILLINOIS

At the request of the Secretary of the American Microscopical Society the following notes on Biological Methods in use at the University of Illinois have been gathered with an aim toward offering suggestions that might be of value to the readers of the Transactions who are looking for shorter cuts and improved methods in their Biological work. The writer makes no claim of discovery or of originality for the greater part of the methods offered here, in truth many of them are old facts revived while some of them are but modifications of standard biological methods.

For clearing bulky and difficult objects.—The use of synthetic oil of wintergreen as a clearing agent for microscopic mounts of whole objects greatly increases their transparency. Objects which appear opaque after treatment with cedar oil, xylol, or toluol, by the use of synthetic oil of wintergreen become highly translucent. This is especially true in the case of solid parenchymatous animals such as large trematodes, leeches, and planarians. Violent diffusion currents accompanying the transfer from absolute alcohol to the oil may be avoided by running the specimens through a series of mixtures of absolute alcohol and the oil. In most cases three or four such mixtures are sufficient, though for animals with thin body walls and large internal cavities the writer has found as many as six grades necessary at times. From the oil of wintergreen transfer to Canada balsam or damar in xylol on a slide and add coverglass.

Damar as a mounting medium.—Damar dissolved in xylol has many advantages over Canada balsam. Balsam turns a dark brown with age. In mounts of embryos or other objects where considerable volume of the mounting medium is used this change of color soon impairs the value of a mount. Damar retains its light color and perfect transparency indefinitely. In preparing either damar or balsam it is well to dissolve in an excess of xylol. This gives a very thin liquid which should be run through filter paper. After filtering evaporate the excess of oil as rapidly as possible to prevent chances of contamination by acid fumes or by dust from the air. This is best accomplished by placing the damar or balsam over a steam bath, though by using care the oil may be driven off by placing the liquid in a porcelain dish over a gas flame.

To facilitate penetration of fluids in organisms with a heavy cuticula.—Many animals covered with an unbroken cuticula strongly resist the penetration of fluids. In many cases where there are large internal cavities this causes the specimens to turn black or sometimes opaque chalky white when brought into the mounting medium, damar or balsam. Some avoid this by cutting the animal into pieces. This allows free penetration through the cut surfaces but is almost sure to lead to confusion in interpreting the relations of parts. The writer has found that several small punctures through the cuticula while the animal is still in alcohol allow the clearing and mounting media to enter freely. By performing this operation under a binocular the holes can be made with a very fine needle in regions of the body where they will least interfere with internal structures.

For best results with the oil immersion objective a drop of immersion oil, or a drop of water, should be placed upon the upper surface of the substage condenser and brought into contact with the bottom of the slide. This prevents refraction of light by the air between the condenser and the slide, thus producing stronger illumination of the field.

Safety razor blades for the microtome.—In using an adapter for safety razor blades in a rotary microtome it has been found that a fairly heavy double-edged blade, such as the Durham-Duplex, gives less vibration and for that reason more uniform and better sections than are possible with the extremely thin blades. The blade mentioned also has a much longer cutting edge.

To hinge the lids of wooden slide boxes.—Lids of the ordinary wooden slide boxes very readily become separated from their proper boxes and unfortunately are not ofter interchangeable. A strip of gummed cloth tape answers very well as a means of binding these lids and at the same time prevents interchanging the covers.

A table for the microtome.—A suitable table for a microtome that is used by several persons in different rooms often becomes a problem. In the local Department of Zoology this has been solved by using a typewriter cabinet manufactured by the Toledo Metal Furniture Company. This cabinet consists of a table mounted upon wheels. The microtome is bolted to the table. When in use the top is rolled back and the two hinged sides are lowered, forming ample working space. By throwing a lever the stand is raised off the wheels onto a set of legs which gives greater stability. This arrangement serves admirably for ordinary histological work, but for perfect series of thin sections the stand is not rigid enough to give great precision with a rotary microtome.

To remove balsam from old slides and coverglasses.—Balsam may be removed from old slides and coverglasses by boiling them in a strong solution of "Gold Dust". All paraffin should be removed before putting slides to soak in this mixture, otherwise a film which is hard to remove forms over the surface of the glass.

The use of modeling clay in a beginning class.—The difficulty of inducing the beginner with the microscope to interpret miscroscopic objects in three dimensions may be eliminated to great extent by requiring each student to model some animal such as the Paramecium. Modeling clay may be purchased from any artists' supply house.

A transparent seal for museum jars.—Celluloid wet with acetone makes a transparent seal for the covers of museum jars. Celluloid strips, or a ring in the case of a round jar, should be cut just a little wider than the ground glass surfaces to be cemented. The celluloid is then dipped in acetone, placed upon the edge of the jar and the cover applied before the acetone has evaporated. Slight pressure should be applied until the celluloid has set.

A slide marker for use with the microscope.—In dealing with gross structures carbon ink is frequently used to direct attention to a certain section of a series on a slide. Frequently finer details need to be marked for future reference. For this work the pen is too uncertain. The Leitz Microscope Company have an object marker which meets the demand for a marker of any sized area admirably. A diamond is fitted eccentrically upon a dummy objective. The spot to be marked is brought into the exact center of the field and the marker is swung into place instead of the objective. By bringing the diamond point into contact with the coverglass and rotating the marker a circle is scratched upon the coverglass around the field desired. The diameter of the circle may be regulated at will by means of a set-screw. In making class demonstrations with the microscope a series of slides once marked may be referred to at any time without the necessity of hunting over an entire collection or even over the slides that are known to contain the demonstrations desired.

An insect mount for class study.—The Department of Entomology has been devising mounts for insects to be used in large classes in economic entomology where it becomes impracticable to furnish each student with several specimens of every form studied. One of the most successful mounts is the one for Lepidoptera which requires for its manufacture: two thin pieces of glass (preferably coverslips for lantern slides), a sheet of heavy cardboard or picture mounting board, and passepartout paper. A square hole of proper size for the specimen to be mounted is cut from the center of the card. An insect either spread or with wings folded may be held in the chamber formed by placing a sheet of glass on each side of the card. The edges of the mount are then bound with passepartout paper. Protection against Dermestidae is secured by cutting one or more holes in the edges of the card and filling these with napthaline crystals.

A double demonstrating eye piece for the microscope.—It is ofter difficult to make sure that the beginning student sees the thing he is supposed to see under the microscope. A double demonstrating eye-piece which fits in the microscope in place of the ordinary ocular enables the instructor and the student to observe the same field at the same time. The adjustable needle pointer in this instrument makes it possible for the instructor to point out the organism to be studied and under other circumstances he may require the student actually to point out structures which he thinks he has seen. This instrument is manufactuured by E. Leitz.

Preserving plants in their natural colors.—In the Botany department of this Institution extensive use is being made of a method for preserving green plants in their natural colors. Fifty per cent acetic acid in water is saturated with copper acetate as a stock solution. To one part of the stock solution add four parts of water and in this boil for ten minutes the plants to be preserved. After this treatment put the plants into four percent formalin for preservation. Fungus spots and insect pests show much more naturally in materials prepared in this way than they do in materials that have been bleached out in the preservative.

To seal vials and bottles.—Gutta percha and paraffin melted together give much better results than paraffin alone for sealing corked vials and bottles to prevent evaporation. The gutta percha prevents the mixture from becoming friable.

Ripening hematoxylin.—Many text books on histological methods still hold to the idea that hematoxylin stains must ripen at least three weeks before they are ready for use. By adding a small amount of hydrogen peroxide to a stock bottle of newly prepared hematoxylin the stain becomes usable in a very few hours. The minimum time required for ripening by this process has not been determined though the writer has obtained perfect results from Ehrlich's hematoxylin six hours after it was prepared.

University of Illinois.
Urbana, Ill. H. J. VAN CLEAVE.

SUPERIOR IMMERSION FLUID

For 4 years V. Jensen, (Hospitalstidende, Copenhagen. Dec. 2, LVII. No. 48) has been using a mixture of alpha brom-naphthelin, 24 parts, with 76 parts liquid paraffin, and has found it extremely satisfactory as an immersion fluid. He tests it to get the refraction index the same as that of the ordinary immersion oil. Its advantage over the latter is: It flows easily; keeps perfectly, even uncovered; can be easily removed at any time, early or late; it does not dry out, and the specimen keeps its color perfectly.